

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
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in its capacity as elected Office

Date of mailing (day/month/year)

13 June 2000 (13.06.00)

International application No.

PCT/IB99/01573

Applicant's or agent's file reference

F14583IN

International filing date (day/month/year)

23 September 1999 (23.09.99)

Priority date (day/month/year)

12 October 1998 (12.10.98)

Applicant

SWANEPOEL, Adriaan, Retief et al

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

27 April 2000 (27.04.00)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was



was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
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1211 Geneva 20, Switzerland

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Authorized officer

Olivia RANAIVOJAONA

Telephone No.: (41-22) 338.83.38

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(71) Applicant (for all designated States except US): TRICO PRODUCTS CORPORATION [ZA/US]; 3255 West Hamlin Road, Rochester Hills, MI 48309 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): SWANEPOEL, Adriaan, Retief [ZA/ZA]; 309 Aries Street, Waterkloof Ridge, 0181 Pretoria (ZA). FEHRSEN, Johannes, Hendrik [ZA/ZA]; 44 Main Street, 2001 Johannesburg (ZA).

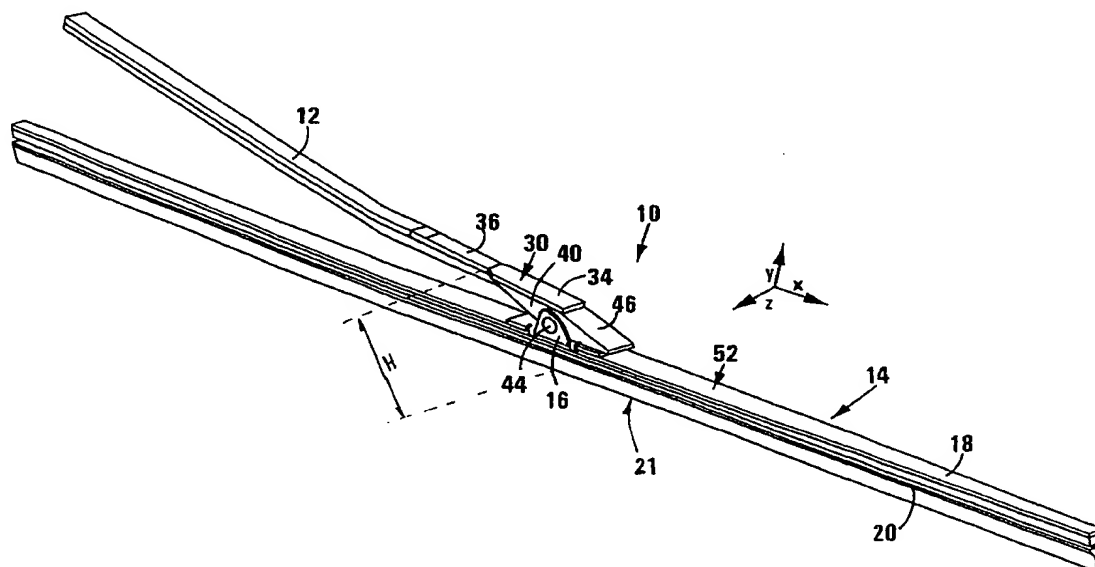
(74) Agent: NACHENIUS, Elizabeth; Adams & Adams (Johannesburg Office), 3rd floor, 23 Wellington Road, Parktown, P.O. Box 10155, 2000 Johannesburg (ZA).

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Published

With international search report.

(54) Title: A WINDSCREEN WIPER



(57) Abstract

A windscreen wiper (14) assembly includes a wiper arm (12) and a windscreen wiper having a resiliently flexible elongate beam (18) which is curved in a plane. The assembly also includes a coupler (16) for coupling an end of the wiper arm (12) to the wiper (14) in such a manner that resilient bending movement of the beam in the plane of curvature along its full length is substantially allowed. The invention also relates to a coupler for a windscreen wiper assembly.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 99/01573

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60S1/40 B60S1/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 98 19899 A (ROBERT BOSCH GMBH) 14 May 1998 (1998-05-14) abstract; claims 1-4,8-11; figures page 3, line 5 - line 25 page 7, line 15 -page 10, line 30	1,2,10, 11,26,27 3,12,19, 21
X A	EP 0 528 643 A (ANGLO AMERICAN IND CORP LTD) 24 February 1993 (1993-02-24) abstract; figures 1-3 page 4, line 3 - line 18	1,2,10, 11,26,27 3,12,21
X A	WO 98 15438 A (ROBERT BOSCH GMBH) 16 April 1998 (1998-04-16) abstract; figures page 6, line 4 -page 8, line 4 -/-	1,2,10, 11,26,27 3,12,19, 21

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier document but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
 "G" document member of the same patent family

Date of the actual completion of the international search

13 December 1999

Date of mailing of the international search report

17/12/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3018

Authorized officer

Westland, P

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 99/01573

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 785 002 A (QUINLAN W ET AL) 15 January 1974 (1974-01-15) figures 1-6 column 2, line 53 -column 3, line 38 <u> </u>	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IB 99/01573

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9819899	A	14-05-1998	DE 19645170 A	07-05-1998
			EP 0869886 A	14-10-1998
EP 0528643	A	24-02-1993	AU 651237 B	14-07-1994
			AU 2108092 A	25-02-1993
			CA 2076268 A	17-02-1993
			DE 69203303 D	10-08-1995
			DE 69203303 T	14-03-1996
			ES 2077984 T	01-12-1995
			JP 5254399 A	05-10-1993
			MX 9204682 A	31-05-1994
			RU 2091257 C	27-09-1997
			US 5325564 A	05-07-1994
			ZA 9206186 A	01-03-1993
WO 9815438	A	16-04-1998	DE 19641042 A	09-04-1998
US 3785002	A	15-01-1974	NONE	

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10 OCT 2000

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference F14583 IN/vd		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB99/01573	International filing date (day/month/year) 23/09/1999	Priority date (day/month/year) 12/10/1998	
International Patent Classification (IPC) or national classification and IPC B60S1/40			
Applicant TRICO PRODUCTS CORPORATION et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 27/04/2000	Date of completion of this report 06.10.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Durand-Smet, J Telephone No. +49 89 2399 8881 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB99/01573

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

6-8	as originally filed		
1-5	as received on	07/09/2000	with letter of 07/09/2000

Claims, No.:

1-12	as received on	07/09/2000	with letter of 07/09/2000
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Drawings, sheets:

1/5-5/5	as originally filed
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2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB99/01573

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-12
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

To item V:

1. According to claim 1, the invention relates to a coupler for coupling an end of a wiper arm to a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane, comprising a support structure and a mounting means for mounting the support structure to the beam. Furthermore, the invention according to claim 9 relates to a windscreen wiper assembly which includes a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane and such a coupler.

A coupler and a windscreen wiper assembly of this type are known,
e.g. from WO-A-98/19 899.

2. Vis-à-vis this prior art coupler, the subject-matter of claim 1 differs in that the coupler has at least one spacing formation carried by the support structure, engageable in use with an upper surface of the beam, for spacing the upper surface of the beam a predetermined distance from the support structure.

As emphasized in the description of the present PCT-application,

- on page 1, last line
- on page 3, first paragraph, lines 50 to 52
- on page 4, second paragraph, lines 77 to 79

a space is thereby provided in which the beam can flex, in use.

3. As there is no suggestion to a skilled person among the other cited prior art documents to provide a coupler of a windscreen wiper assembly of the type disclosed in WO-A-98/19 899 with at least one spacing formation as noted in paragraph 2. above, the subject-matters of claims 1 and 9 seem to be novel and inventive under the terms of article 33 (1) and (3) PCT.
4. As far as the dependent claims 2 to 8 and claims 10 to 12 refer to further developments in line with claims 1 and 9, their subject-matters seem to be also novel and inventive and thus to comply with article 33 (1) to (3) PCT.

To item VII:

The indication that each spacing formation or protrusion (26.1, 26.2) may have a sharpened edge has not been disclosed in the original PCT-application documents (Description, claims and drawings). Therefore, this indication should be crossed out such that the description on page 2, penultimate paragraph, lines 42 to 44 reads:

"Each protrusion may have a rounded edge to allow bending of the beam."
(Article 34 (2) (b) PCT)

To items VII und VIII:

1. The objective of the invention should be clearly emphasized in claim 1 as it is on page 1, line 28 of the description. Therefore, the end of claim 1 should read:
"... the support structure, thereby to provide a space in which the beam can flex, in use."
2. Under those circumstances, the indication that *"The spacing between the upper surface of the beam and the bottom surface of the support structure is (may be) sufficient to permit flexing, in use, of the beam"* as it is also specified in claim 10 and in page 3, first paragraph, seems to be redundant.

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A WINDSCREEN WIPER

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This invention relates to a windscreen wiper. More particularly, the invention relates to a windscreen wiper assembly and to a coupler for a windscreen wiper assembly.

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According to a first aspect of the invention, there is provided a windscreen wiper assembly which includes

a wiper arm;

a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane; and

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a coupler for coupling an end of the wiper arm to the wiper in such a manner that resilient bending movement of the beam in the plane of curvature along its full length is substantially allowed.

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The coupler may be mounted to the wiper such that longitudinal movement of the beam relative to a point on the coupler, rotation of the beam about its longitudinal axis and rotation of the longitudinal axis of the beam relative to the longitudinal axis of the arm (known as fish tailing) is substantially inhibited.

30

According to a second aspect of the invention, there is provided a windscreen wiper assembly which includes

a wiper arm;

a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane; and

a coupler for coupling an end of the wiper arm to the wiper, the coupler comprising a support structure with at least one fulcrum formation being defined by the support structure and a mounting means carried on the support structure for mounting the coupler to the beam at two spaced apart points so that the, or each, fulcrum formation abuts an upper surface of the beam and bending movement of the beam about the, or each, fulcrum formation in the plane of curvature is allowed.

The support structure may have an elongate, substantially planar base, with a pair of spaced apart fulcrum formations being defined on a bottom surface of the base. Each fulcrum formation may be in the form of an elongate protrusion located transversely to the base and in use, transversely to the plane of curvature. Each protrusion may have rounded or sharpened edges to allow movement of the beam about it.

The mounting means may be in the form of two pairs of spaced apart claws which extend from the base of the support structure. Each of the fulcrum formations may be located proximate or be aligned with one of the pairs of claws.

The beam may be provided with a securing formation which is complementary to one of the pairs of claws, for securing the support structure to the beam at that point so that longitudinal movement of the beam relative to the coupler is inhibited at that point. Those skilled in the art will appreciate that relative longitudinal movement will be permitted between the beam and the support structure at the pair of claws spaced from the securing formation.

The spacing between the claws of each pair may be substantially equal to the width of the beam at the position of connection in order to inhibit pivoting or twisting of the beam about its longitudinal axis and to impede relative lateral movement.

60

The assembly may also include a connecting structure for pivotally connecting the end of the wiper arm to the wiper to allow pivotal movement of the wiper arm relative to the wiper in the plane of curvature. It will be appreciated that the connecting structure may form a part of the coupler or of the arm or a combination of both.

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It will be appreciated that the windscreen wiper assembly as described above, significantly reduces the height required between a windscreen and a vehicle bonnet in order to improve wind flow over the vehicle and allow the windscreen wiper assembly and arm to be hidden below the vehicle bonnet.

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According to a third aspect of the invention, there is provided a windscreen wiper assembly which includes

a wiper arm;

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a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane; and

a coupler for coupling an end of the wiper arm to the wiper, the coupler comprising a support structure, with at least one spacing formation carried by the support structure, and a mounting means for mounting the coupler to the beam at two spaced apart points, with the, or each spacing formation abutting an upper surface

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of the beam so that a bottom surface of the support structure is spaced a predetermined distance from the upper surface of the beam.

85 The support structure may have an elongate, substantially planar base, with a pair of spaced apart spacing formations in the form of fulcrum formations being defined on a bottom surface of the base.

90 It will be appreciated that the invention has specific application to a low profile wiper and that the coupler is designed to minimise the distance or space between the bottom surface of the support structure and the upper surface of the beam. It will also be appreciated that the distance or space is dependent on the distance between the points of contact and will accordingly be larger when the points of contact are further apart to allow for bending movement of the wiper between the points of contact. A height dimension from a bottom edge of a rubber which is
95 mounted to the beam of the wiper and the highest protrusion of the coupler may be less than 25 mm and preferably is less than 20 mm.

According to a fourth aspect of the invention, there is provided a coupler for a windscreen wiper assembly, for coupling an end of a wiper arm to a beam of the
100 wiper, which includes

a support structure with at least one fulcrum formation being defined by the support structure; and

a mounting means carried on the support structure for mounting the coupler to the beam at two spaced apart points so that the, or each, fulcrum formation abuts an

105 upper surface of the beam and bending movement of the beam about the, or each, fulcrum formation in the plane of curvature is allowed.

The support structure may have an elongate, substantially planar base, with a pair of spaced apart fulcrum formations being defined on a bottom surface of the
110 base. Each fulcrum formation may be in the form of an elongate protrusion located transversely to the base and in use, transversely to the plane of curvature.

The mounting means may be in the form of two pairs of spaced apart claws which extend from the base of the support structure. Each of the fulcrum formations
115 may be aligned with one of the pairs of claws.

The invention is now described, with reference to the accompanying drawings, in which;

Figure 1 shows a schematic isometric view of a windscreen wiper assembly, in
120 accordance with one aspect of the invention, with the wiper shown in a straightened condition;

Figure 2 shows a partially exploded view of the assembly of Figure 1;

Figure 3 shows an enlarged view of part of the assembly of Figure 1;

Figure 4 shows a sectional end elevation of the assembly of Figure 3 taken along
125 the line IV-IV in Figure 3.

Figure 5 shows a detailed view of part of a windscreen wiper which forms part of the assembly shown in Figure 1;

Figure 6 shows a schematic isometric view of a coupler for a windscreen wiper assembly, in accordance with another aspect of the invention;

CLAIMS:

- 205** 1. A windscreen wiper assembly which includes
- a wiper arm;
- a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane; and
- a coupler for coupling an end of the wiper arm to the wiper in such a manner that
- 210** resilient bending movement of the beam in the plane of curvature along its full length is substantially allowed.
2. The windscreen wiper assembly as claimed in Claim 1, in which the coupler is mounted to the wiper such that longitudinal movement of the beam relative to a
- 215** point on the coupler, rotation of the beam about its longitudinal axis and rotation of the longitudinal axis of the beam relative to longitudinal axis of the arm is substantially inhibited.
3. A windscreen wiper assembly which includes
- 220** a wiper arm;
- a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane; and
- a coupler for coupling an end of the wiper arm to the wiper, the coupler comprising a support structure with at least one fulcrum formation being defined by
- 225** the support structure and a mounting means carried on the support structure for mounting the coupler to the beam at two spaced apart points so that the, or each, fulcrum formation abuts an upper surface of the beam and bending movement of the beam about the, or each, fulcrum formation in the plane of curvature is allowed.

4. The windscreen wiper assembly as claimed in Claim 3, in which the support
230 structure has an elongate, substantially planar base, with a pair of spaced apart
fulcrum formations being defined on a bottom surface of the base.

5. The windscreen wiper assembly as claimed in Claim 4, in which each fulcrum
formation is in the form of an elongate protrusion located transversely to the base and
235 in use, transversely to the plane of curvature.

6. The windscreen wiper assembly as claimed in Claim 5, in which the
mounting means is in the form of two pairs of spaced apart claws which extend from
the base of the support structure.

240 7. The windscreen wiper assembly as claimed in Claim 6, in which each of the
fulcrum formations is aligned with one of the pairs of claws.

8. The windscreen wiper assembly as claimed in Claim 7, in which the beam
245 is provided with a securing formation which is complementary to one of the pairs of
claws, for securing the support structure to the beam at that point so that longitudinal
movement of the beam relative to the coupler is inhibited at that point.

9. The windscreen wiper assembly as claimed in Claim 6, in which the spacing
250 between the claws of each pair is substantially equal to the width of the beam at the
position of connection.

10. The windscreen wiper assembly as claimed in Claim 1, in which the assembly includes a connecting structure for pivotally connecting the end of the wiper arm to the wiper to allow pivotal movement of the wiper arm relative to the wiper in the plane of curvature.

11. The windscreen wiper assembly as claimed in Claim 10, in which a height dimension from a bottom edge of a rubber which is mounted to the beam of the wiper and the highest point of the coupler is less than 25 mm.

12. A windscreen wiper assembly which includes

a wiper arm;

a windscreen wiper having a resiliently flexible elongate beam which is curved in a plane; and

a coupler for coupling an end of the wiper arm to the wiper, the coupler comprising a support structure, with at least one spacing formation carried by the support structure, and a mounting means for mounting the coupler to the beam at two spaced apart points, with the, or each spacing formation abutting an upper surface of the beam so that a bottom surface of the support structure is spaced a predetermined distance from the upper surface of the beam.

13. The windscreen wiper assembly as claimed in Claim 12, in which the support structure has an elongate, substantially planar base, with a pair of spaced apart spacing formations in the form of fulcrum formations being defined on a bottom surface of the base.

14. The windscreen wiper assembly as claimed in Claim 13, in which each fulcrum formation is in the form of an elongate protrusion located transversely to the base and in use, transversely to the plane of curvature.

15. The windscreen wiper assembly as claimed in Claim 14, in which the mounting means is in the form of two pairs of spaced apart claws which extend from the base of the support structure.

16. The windscreen wiper assembly as claimed in Claim 15, in which each of the fulcrum formations is aligned with one of the pairs of claws.

17. The windscreen wiper assembly as claimed in Claim 16, in which the beam is provided with a securing formation which is complementary to one of the pairs of claws, for securing the support structure to the beam at that point so that longitudinal movement of the beam relative to the coupler is inhibited at that point.

18. The windscreen wiper assembly as claimed in Claim 15, in which the spacing between the claws of each pair is substantially equal to the width of the beam at the position of connection.

19. The windscreen wiper assembly as claimed in Claim 12, in which the assembly includes a connecting structure for pivotally connecting the end of the wiper arm to the wiper to allow pivotal movement of the wiper arm relative to the wiper in the plane of curvature.

20. The windscreen wiper assembly as claimed in Claim 12, in which a height dimension from a bottom edge of a rubber which is mounted to the beam of the wiper and the highest point of the coupler is less than 25 mm.

21. A coupler for a windscreen wiper assembly, for coupling an end of the wiper arm to a beam of the wiper, which includes

a support structure with at least one fulcrum formation being defined by the support structure; and

a mounting means carried on the support structure for mounting the coupler to the beam at two spaced apart points so that the, or each, fulcrum formation abuts an upper surface of the beam and bending movement of the beam about the, or each, fulcrum formation in the plane of curvature is allowed.

22. The coupler as claimed in Claim 21, in which the support structure has an elongate, substantially planar base, with a pair of spaced apart fulcrum formations being defined on a bottom surface of the base.

23. The coupler as claimed in Claim 22, in which each fulcrum formation is in the form of an elongate protrusion located transversely to the base and in use, transversely to the plane of curvature.

24. The coupler as claimed in Claim 23, in which the mounting means is in the form of two pairs of spaced apart claws which extend from the base of the support structure.

25. The coupler as claimed in Claim 24, in which each of the fulcrum formations is aligned with one of the pairs of claws.

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26. A windscreen wiper assembly, substantially as herein described with reference to the accompanying drawings.

27. A coupler for a windscreen wiper assembly, substantially as herein described with reference to the accompanying drawings.

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PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference F14583IN	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/IB 99/ 01573	International filing date (day/month/year) 23/09/1999	(Earliest) Priority Date (day/month/year) 12/10/1998
Applicant TRICO PRODUCTS CORPORATION et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.
☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title.

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract.

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 99/01573

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

line 1 + 3: insert after "arm" "(12)"
line 1 + 3: insert after "wiper" "(14)"
line 2: insert after "beam" "(18)"
line 3: insert after "coupler" "(16)"

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60S1/40 S1/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 98 19899 A (ROBERT BOSCH GMBH) 14 May 1998 (1998-05-14) abstract; claims 1-4,8-11; figures page 3, line 5 - line 25 page 7, line 15 -page 10, line 30 ---	1,2,10, 11,26,27 3,12,19, 21
X A	EP 0 528 643 A (ANGLO AMERICAN IND CORP LTD) 24 February 1993 (1993-02-24) abstract; figures 1-3 page 4, line 3 - line 18 ---	1,2,10, 11,26,27 3,12,21
X A	WO 98 15438 A (ROBERT BOSCH GMBH) 16 April 1998 (1998-04-16) abstract; figures page 6, line 4 -page 8, line 4 --- -/--	1,2,10, 11,26,27 3,12,19, 21

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "C" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

13 December 1999

Date of mailing of the international search report

17/12/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel: (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Westland, P

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 3 785 002 A (QUINLAN W ET AL) 15 January 1974 (1974-01-15) figures 1-6 column 2, line 53 -column 3, line 38 -----</p>	1

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9819899	A	14-05-1998	DE 19645170 A EP 0869886 A	07-05-1998 14-10-1998
EP 0528643	A	24-02-1993	AU 651237 B AU 2108092 A CA 2076268 A DE 69203303 D DE 69203303 T ES 2077984 T JP 5254399 A MX 9204682 A RU 2091257 C US 5325564 A ZA 9206186 A	14-07-1994 25-02-1993 17-02-1993 10-08-1995 14-03-1996 01-12-1995 05-10-1993 31-05-1994 27-09-1997 05-07-1994 01-03-1993
WO 9815438	A	16-04-1998	DE 19641042 A	09-04-1998
US 3785002	A	15-01-1974	NONE	

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

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INTERNATIONAL SEARCH REPORT

International Application No.

PCT/IB 99/01573

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 IPC 7 B60S1/40 B60S1/38

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 661 epo nl,
 Fax (+31-70) 340-3018

Authorized officer

Westland, P

INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 99/01573

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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WO 9815438	A	16-04-1998	DE 19641042 A	09-04-1998
US 3785002	A	15-01-1974	NONE	